

Studies on Monstereae (Araceae) of Peninsular Malaysia II: *Rhaphidophora latevaginata*, Newly Recorded for West Malaysia

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Abstract

Rhaphidophora latevaginata M.Hotta, a neotenic, shingling, climbing aroid, hitherto considered a Bornean endemic, has recently been found and collected from the southern part of the east coast of Peninsular Malaysia (Johor: Kota Tinggi and Mersing), where so far it appears to be restricted to *kerapah* and the drier (raised podzol) facies of seasonally inundated peat swamp forest. This discovery of *R. latevaginata* takes to 18 the number of *Rhaphidophora* known to occur in Peninsular Malaysia, of which three are endemic. An updated description of *R. latevaginata*, a key to the *Rhaphidophora* species of Peninsular Malaysia, and a plate illustrating the diagnostic characters of those with shingle-stage juveniles is presented. A brief note on the significance of the new record with regard the Riau Pocket is made.

Introduction

Since the publication of an alpha-taxonomy for Peninsular Malaysia (Boyce, 1999), and the Peninsular-relevant taxonomic alterations made for Borneo (Boyce, 2001), further study of *Rhaphidophora* in Peninsular Malaysia has generated additional data that sheds light on possible biogeographical patterns not earlier apparent. Most recently the discovery in Perak of *R. megasperma* Engl. (Baharuddin & Boyce, in press), previously regarded as a Bornean endemic and furthermore belonging to a species group until now considered to be restricted to E Sunda, Papuasias, and the tropical Western Pacific, and now the discovery of *R. latevaginata* in Johor, is providing compelling non-woody plant support to the Riau Pocket phytochore (Corner, 1960; Ashton, 2005). All terminology used here follows Boyce (1999).

Key to *Rhaphidophora* in Peninsular Malaysia (adult plants)

1. Leaf lamina variously pinnately divided and/or perforated2
1. Leaf lamina entire.....9
2. Leaf lamina abaxially pubescent, especially the mid-rib and primary lateral veins.....3
2. Leaf lamina abaxially glabrous.....4
3. Plants flowering on adherent stems; mature leaves with numerous perforations along both sides of the mid-rib***R. foraminifera***
3. Plants flowering on free stems; mature leaves with one to three perforations on one side of the mid-rib.....***R. puberula***
4. Rheophytes; leaves of flowering plants occasionally entire.....***R. beccarii***
4. Medium to high-climbing lianes; leaves of flowering plants never entire.....5
5. Active shoot apices with sparse to copious netted fibre; feeding roots conspicuously ramentose-scaly; lamina of mature plants pinnatisect, the pinnae often perforated basally and appearing stilted. Juvenile plants with leaves overlapping in the manner of roof shingles (shingle climbers).....***R. korthalsii***
5. Active shoot apices glabrous; feeding roots smooth or slightly corky-lenticillate; lamina of mature plants variously split and perforated but never with the pinnae perforated basally and appearing stilted. Juvenile plants not shingle climbers)...6
6. Leaf lamina at least partially pinnate.....6
6. Leaf lamina not pinnate, either entire or with a few, large ovate to rhomboid or trapezoid perforations, these sometimes extending almost to the margin.....8
7. Leaf lamina up to 53 × 105 cm; sparsely to rarely ± entirely pinnatipartite, or pinnatisect; petiole 40-70 cm long, petiolar sheath extending ½ - ¾ along petiole; spadix up to 14 × 2 cm, stoutly cylindrical, inserted decurrently from 2 cm on peduncle; plants exclusively of montane forest.....***R. nicolsonii***
7. Leaf lamina up to 42 × 38 cm but usually much smaller, sparsely to ± entirely deeply pinnatipartite to nearly pinnatisect, occasionally with large rhombic perforations adjacent to mid-rib; petiole 10-34cm long, petiolar sheath extending to base of apical pulvinus, inflorescences a few together, spadix up to 3.5 × 1 cm, cylindrical, inserted slightly decurrently on peduncle; plants of lowland forest.....***R. tetrasperma***
8. Inflorescence two (sometimes more?) together, each subtended by a prominent, soon falling, cataphyll, and arising from an elongated reiterative floral sympodium at the tip of a plagiotropic free lateral shoot; spathe caducous; stigma impressed irregularly elliptic, longitudinally orientated.....***R. corneri***
8. Inflorescence three or more together, each subtended by a prominent persistent, later marcescent cataphyll, and arising from an much abbreviated reiterative floral sympodium arising laterally on a climbing shoots; spathe marcescent; stigma raised, punctiform.....***R. megasperma***

9. Leaves always shingling, even in flowering individuals; leaf laminas stiffly coriaceous, broadly oblong-ovate-elliptic, 8.48 × 6.5-20.5 cm, bright green, slightly to markedly glaucous, base truncate-cordate to broadly cuneate. Flowering on clinging shoots ***R. latevaginata***
9. Leaves spreading in adult and flowering individuals; leaf laminas variously coloured but never glaucous. Flowering on free or clinging shoots.....10
10. Abaxial surface of lamina and apical pulvinus pubescent.....***R. puberula***
10. Lamina and apical pulvinus not as above.....11
11. Flowering shoots consisting of scattered fans of large litter-trapping leaves carried on short stout shoots and held at about 90° to the ± leafless main stem.....
..... ***R. angustata***
11. Flowering shoots not as above.....12
12. Plant climbing; feeding roots smooth, or minutely asperate.....13
12. Plant rheophytic; feeding roots conspicuously ramentaceous.....***R. beccarii***
13. Stems sub-terete to weakly 4-angled, scabrid to asperous, older portions with thin, brittle pale brown epidermis; spathe exterior minutely puberulent..... ***R. lobbii***
13. Stems conspicuously 4-angled, smooth, older portions remaining green; spathe exterior glabrous..... 14
14. Apices of active stems with netted prophyll, cataphyll and petiolar sheath remains ***R. maingayi***
14. Apices of active stems naked.....15
15. Spadix at anthesis 9-20 cm long, tapering apically.....16
15. Spadix at anthesis 3.5-6 cm long, cylindrical to weakly clavate.....17
16. Spadix 9-11 cm long; sandstone & granite.....***R. montana***
16. Spadix 15-20 cm long; limestone obligate.....***R. burkilliana***
17. Spadix cylindrical.....18
17. Spadix weakly clavate.....***R. sylvestris***
18. Leaf lamina thickly coriaceous to almost fleshy, falcate-elliptic- lanceolate to falcate- oblong or falcate-oblancoate, 4.5-25.5 × 1.5-5 cm; margins slightly reflexed, this becoming greatly accentuated in dried material.....***R. crassifolia***
18. Leaf lamina thinly coriaceous, narrowly falcate-elliptic to falcate-lanceolate or falcate-oblancoate, 2.5-16 × 1.2-3 cm, margins flat, leaf drying pale straw-coloured.....***R. minor***



Plate 1. A-B. *Rhaphidophora latevaginata* M.Hotta. A. Leaf (abaxial view) showing the strongly unequal wings of the long-persistent petiolar sheath. Note that the sheath is mainly adnate to the moderately short petiole, with only a short free-auriculate portion. B. Juvenile plant. C-D. *Rhaphidophora kothalsii* Schott. C. Leaf (abaxial view) showing the equally wings to the swiftly-marcescent petiolar sheath. Note that the sheath is mostly free from the very short petiole, with the greater part forming a long, narrowly triangular, free-ligulate portion. D. Feeding root showing the diagnostic ramenta. Images © P.C.Boyce

Rhaphidophora latevaginata M. Hotta, Acta Phytotax. Geobot. 22: 44 (1966); Boyce, Gardens' Bulletin Singapore 53: 51-54, Fig. 10 (2001). –**Type:** Malaysia, Sarawak, Bintulu ('4th Division'), Bintulu District, about 4 km east from Minah Camp, Sg. Kakus, 4 Oct 1963, *Hirano & Hotta 140* (KYO, holo!). **Plate 1A & B.**

Moderate to very large, robust, pachycaul, homeophyllous neotenic **liane** to 12 m; seedling stage a non-skototropic shingling juvenile shoot; pre-adult plants forming small terrestrial colonies of shingling closely appressed leaves; adult shoot architecture comprised of clinging, physiognomically unbranched, shingling to very densely leafy, sterile stems and almost identical fertile stems. **Stems** weakly compressed-terete to weakly rectangular in cross-section, smooth, pale green, without prophyll and cataphyll fibre, internodes to 12 × 2 cm, separated by prominent straight scars, but scars obscured by leaf bases on all but the oldest stems, lower parts of stem later sub-woody with slightly shiny cracking thin pale brown epidermis; flagellate foraging stems moderately well developed although often somewhat short and leafy; clasping **roots** arising densely from the nodes and internodes, prominently scaly; feeding roots *ca* 3 mm diam., brown, minutely pubescent. **Leaves** distichous, appressed, ascending and shingling, becoming slightly scattered and spreading (often litter-trapping) towards fertile tips; cataphylls and prophylls membranous, soon drying black and persisting briefly before falling; petiole deeply canaliculate and winged, 3-22 × 0.5-2 cm, smooth, apical and basal pulvinus obscure in young leaves, later becoming prominent, especially the basal pulvinus; petiolar sheath very pronounced, up to 2.5 cm wide, rather thickly membranous, adnate to the petiole for much of their length, prominently rounded short-auriculate, especially the larger (outer) sheath, outer sheath (away from climbing surface) greatly expanded and partly to completely obscuring stem, both sheaths persisting some considerable time, much later (and then almost exclusively on adult plants) rotting to produce two large scars extending to the top of the petiole; lamina broadly oblong-ovate-elliptic, 8-48 × 6.5-20.5 cm stiffly coriaceous, bright green, slightly to markedly glaucous, base truncate-cordate to broadly cuneate, very briefly decurrent, apex rounded to acute with a tiny apicule; midrib prominently raised abaxially, slightly sunken adaxially; primary venation pinnate, slightly raised abaxially, more so adaxially; interprimaries sub-parallel to primaries, slightly raised on both leaf surfaces; secondary venation tessellate-reticulate, slightly raised abaxially, ± flush adaxially, all veins much more prominent in dried material. **Inflorescence** solitary on a clinging shoot, subtended by a fully developed foliage leaf and one or more cataphylls; peduncle laterally compressed-cylindrical, 6.5-11 × 0.5-0.7 cm; **spathe** not observed; **spadix** stoutly cigar-shaped, sessile, inserted + level on stipe, 17.5 × 1.5 cm, pale

green; stylar region rhombohexagonal, *ca* 2 × 1 mm, truncate; stigma slightly raised, elongated, longitudinally orientated, *ca* 0.75 × 0.2 mm; *anthers* not exerted at male anthesis; *infructescence* stoutly cigar-shaped, 15 × 2 cm, stylar region becoming convex at fruit maturity.

Specimens seen: MALAYSIA. **Johor Bahru**, Mersing, Kluang - Mersin Road, km 39, 02° 15' 78.2"; 103° 43' 79.2" 56, 18 Apr 2010, *P.C.Boyce, Siti Nurfaizila Abdul Rahman & Ooi Im Hin AR- 3039* (KEP); Johor Bahru, Kota Tinggi, Hutan Simpan Panti, 01° 51' 65.6"; 103° 54' 10.7" 28, 19 Apr 2010, *P.C.Boyce, Siti Nurfaizila Abdul Rahman & Ooi Im Hin AR- 3046* (KEP). For Borneo specimens see Boyce (2001).

Distribution: West Malaysia (Johor), Borneo (widespread throughout the N and W, but much under-sampled).

Habitat: Primary to secondary moist lowland to hill dipterocarp forest on clay and sandstone, in West Malaysia in *kerapah* and the drier (raised podzol) facies of seasonally inundated peat swamp forest; 20-840 m altitude.

Notes: The juvenile and pre-adult stages of *Rhaphidophora latevaginata* and *R. korthalsii* Schott are superficially similar and to non-specialist difficult to differentiate. The most readily observable characters concern the petiolar sheath, which in *R. latevaginata* is long-persistent (*vs* very swiftly marcescent), mostly adnate (*vs* mostly free) with the wings strongly unequal (*vs* weakly or not at all unequal), and shortly free-auriculate (*vs* long, narrowly triangular free-ligulate). Additionally, the petiole of *R. latevaginata* proportionately longer (petiole:lamina *ca.* 1:5 *vs ca.* 1:12). See Plate 1A & B.

Pre-adult climbing stages of *R. latevaginata* and *R. korthalsii* are also similar but aside from the petiolar sheath characters noted above are readily distinguished by the feeding roots which are minutely pubescent in *R. latevaginata* and conspicuously ramentaceous in *R. korthalsii*. See Plate 1C & D.

While abundant juvenile plants were located, often intermixed with those of *Rhaphidophora korthalsii*, but only a single pre-adult, and no adult, plants were located during the 4-days fieldwork; by contrast, pre-adult and adult plants of *R. korthalsii* were frequent. Nonetheless we have no doubt that the Bornean and West Malaysian plants are one and the same species. Adult and fertile details given above are furnished from Bornean collections.

Phytogeographical Implications

The discovery of another hitherto Bornean endemic in Peninsular Malaysia, following from the recent finding of *Rhaphidophora megasperma* in Perak (Baharuddin & Boyce, in press), gives further weight to the existence of a 'Riau Pocket' phytochore (Corner, 1960; Ashton, 2005).

Of particular interest is the growing evidence that the Riau Pocket phytochore involves plants other than trees, on which distribution and relationships the Riau Pocket was originally postulated. Of yet further interest is that while *R. latevaginata* occurs in the E coast of Riau Pocket phytochore fragment, *R. megasperma* is so far known only from the Perak phytochore fragment.

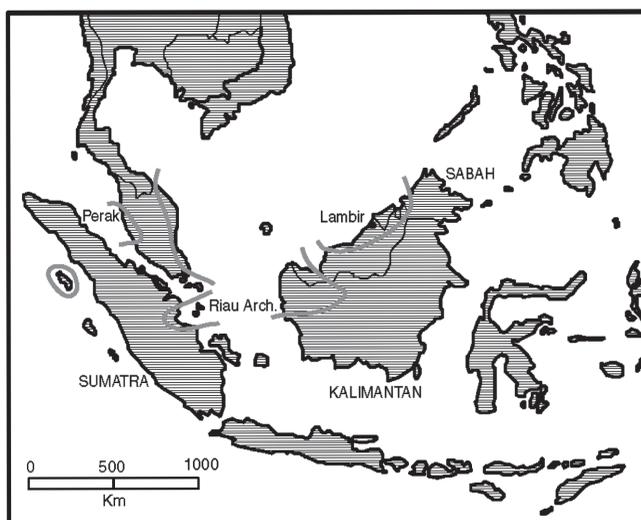


Figure 1. The Riau Pocket phytochore of West Malesia (areas enclosed within heavy lines on northwestern Borneo, Peninsular Malaysia, and Central Sumatra). From: P.S. Ashton. 2005. *Lambir's Forest: The World's Most Diverse Known Tree Assemblage?* p. 199, Fig. 17.6. Used with permission.

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References

- Ashton, P.S. 2005. Lambir's Forest: The World's Most Diverse Known Tree Assemblage? pp. 191-216. In: D.W. Roubik, S.Sakai & A.A. Hamid Karim (eds.). *Pollination Ecology and the Rain Forest: Sarawak Studies*. Springer, New York.
- Baharuddin, S. and P.C. Boyce. 2010. Studies on Monstereae (Araceae) of Peninsular Malaysia I: *Rhaphidophora megasperma*, a new record for West Malaysia. *Tropical Life Sciences Research*: in press.
- Boyce, P.C. 1999. The genus *Rhaphidophora* Hassk. (Araceae-Monsteroideae-Monstereae) in Peninsular Malaysia, and Singapore. *Gardens' Bulletin Singapore* **51**: 183-256.
- Boyce, P.C. 2001. The genus *Rhaphidophora* Hassk. (Araceae-Monsteroideae-Monstereae) in Borneo. *Gardens' Bulletin Singapore* **53**: 19-74.
- Corner, E.J.H. 1960. The Malayan Flora, pp. 21-24. In: R.D. Purchon (ed.). *Proceedings of the Centenary and Bicentenary Congress of Biology*. Singapore.